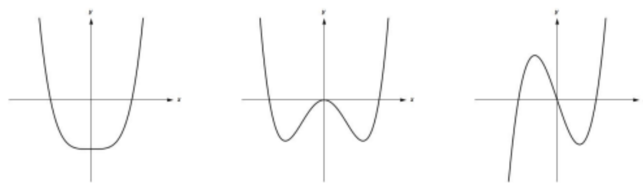
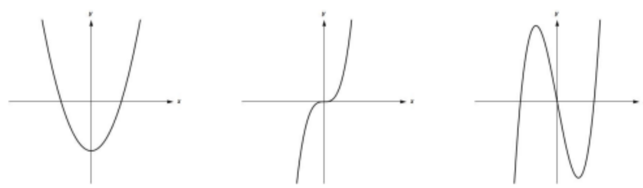
Math 141 **Calculus I** **2/20/2018**

- *Worksheet 3*

1. Match the functions (top row) with the derivatives (bottom row).



(a) (b) (c)



(1) (2) (3)

2. Compute the following derivatives:

$(a)\ y = (2x+1)^5$

$(b)\ y = \left(\dfrac{x^2}{8} + x - \dfrac{1}{x}\right)^4$

$(c)\ y = (4-3x)^9$

$(d)\ y = \sqrt{3x^2 - 4x + 6}$

$(e)\ y = \left(1 - \dfrac{x}{7}\right)^{-7}$

$(f)\ y = \sec\big(\tan(x)\big)$

$(g)\ y = \left(\dfrac{\sqrt{x}}{2} - 1\right)^{-10}$

$(h)\ y = \cot\left(\pi - \dfrac{1}{x}\right)$

$(i)\ y = \tan^3(x)$

$(j)\ y = 5\cos^{-4}(x)$

$(k)\ y = e^{-5x}$

$(l)\ y = e^{2x/3}$

$(m)\ y = e^{5-7x}$

$(n)\ y = e^{(4\sqrt{x}+x^2)}$

3. (Applications)

   (a) The position of a particle moving along a coordinate line is $s(t) = \sqrt{1+4t}$, with s in meters and t in seconds. Find the particles velocity and acceleration as a function of t.

(b) Suppose that the velocity v of a falling body depends on its position s by the function $v(s) = k\sqrt{s}$, where k is some constant. Show that the object has constant acceleration.

(c) The velocity of a heavy meteorite entering Earth's atmosphere is of the form $v(s) = \frac{k}{\sqrt{s}}$ when the meteorite is s kilometers from the Earth's center. Show the acceleration is inversely proportional to s^2.

(d) A particle moves along the x-axis with velocity $dx/dt = f(x)$. Show that the particle's acceleration is $f(x)f'(x)$.